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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/941,125	08/28/2001	Gurtej Singh Sandhu	303.676US5	7117

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EXAMINER

SPERTY, ARDEN B

ART UNIT	PAPER NUMBER
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1775

DATE MAILED: 09/11/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/941,125

Applicant(s)

SANDHU ET AL.

Examiner

Arden B. Sperty

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 June 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 51-56 and 60-85 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 51, 53-56, 60, 62-66, 68-73, 75-79 and 81-85 is/are rejected.
- 7) ☒ Claim(s) 52, 61, 67, 74 and 80 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 August 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

Drawings

1. The drawings are objected to under 37 CFR 1.83(a) because they fail to show the location of the titanium nitride layer and the fill as described in the specification. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

2. The amendment filed June 03, 2002 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: the negative limitation in the amended claims that the titanium alloy layer must be nitride-free.

Applicant is required to cancel the new matter in the reply to this Office Action.

Any negative limitation or exclusionary proviso must have basis in the original disclosure. See *Ex parte Grasselli*, 231 USPQ 393 (Bd. App. 1983), *aff'd mem.*, 738 F.2d 453 (Fed. Cir. 1984). The mere absence of positive recitation is not basis for an exclusion. See MPEP 2173.05(i).

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

4. Claims 51 and 54 are rejected under 35 U.S.C. 102(a) as being anticipated by USPN 5,644,166 to Honeycutt et al.

Regarding claims 51 and 54, the reference discloses an electrically conductive, nitride-free titanium alloy layer ^{Ti 60} formed overlying walls and an exposed base layer of a contact hole and a fill coupled to the titanium alloy layer wherein the fill comprises tungsten or aluminum (col 8, lines 12-16, 30-34) as required by claim 51. The reference discloses the structure of claim 51 further comprising a titanium nitride layer interposed between the titanium alloy layer and the fill (col 8, lines 16-18) as required by claim 54.

5. Claim 53 is rejected under 35 U.S.C. 102(a) as being anticipated by USPN 5,644,166 to Honeycutt et al.

Regarding claim 53, the reference discloses an electrically conductive, nitride-free titanium alloy layer comprising titanium and germanium formed overlying walls and an exposed base layer of a contact hole and a fill coupled to the titanium alloy layer wherein the fill comprises tungsten or aluminum (col 8, lines 12-16, 30-34).

6. Claims 55-56 are rejected under 35 U.S.C. 102(a) as being anticipated by USPN 5,644,166 to Honeycutt et al.

Regarding claims 55-56, the reference discloses an electrically conductive, nitride-free titanium alloy layer comprising titanium and germanium formed overlying walls and an exposed base layer of a contact hole, a fill coupled to the titanium alloy layer wherein the fill comprises tungsten or aluminum and a titanium nitride layer interposed between the titanium alloy layer and the fill (col 8, lines 12-18, 30-34).

7. Claims 60 and 62-65 are rejected under 35 U.S.C. 102(a) as being anticipated by USPN 5,644,166 to Honeycutt et al.

Regarding claim 60, the reference discloses a via comprising a first layer of electrically conductive nitride-free titanium alloy within a contact opening in an insulating layer (col 2, lines 28-30) wherein the titanium alloy comprises titanium and germanium, a second layer of titanium silicide coupled to the first layer, and a tungsten or aluminum fill coupled to the titanium alloy layer (col 8, lines 12-18, 30-34).

The reference discloses the structure of claim 60 further comprising a titanium nitride layer interposed between the titanium alloy layer and the fill (col 8, lines 16-18) as required by claim 62.

Regarding claims 63 and 65, the reference discloses the structure of claim 60 wherein the first layer is coupled to a sidewall of a high aspect ratio contact opening (col 8, lines 14-15; col 4, lines 42-36).

Regarding claim 64, the reference discloses the structure of claim 60 wherein the second layer is coupled to an exposed semiconductor surface (col 2, lines 42-45; Fig 7).

8. Claims 66 and 68-72 are rejected under 35 U.S.C. 102(a) as being anticipated by USPN 5,644,166 to Honeycutt et al.

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Regarding claim 66, the reference discloses a via comprising a first layer of electrically conductive nitride-free titanium alloy within a high aspect ratio contact opening in an insulating layer (col 4, lines 32-36; col 8, line 15) wherein the titanium alloy comprises titanium and germanium, a second layer of titanium silicide coupled to the first layer, and a tungsten or aluminum fill coupled to the titanium alloy layer (col 8, lines 12-18, 30-34).

The reference discloses the structure of claim 66 further comprising a titanium nitride layer interposed between the titanium alloy layer and the fill (col 8, lines 16-18) as required by claim 68.

Regarding claims 69-70, the reference discloses the structure of claim 66 wherein the insulating layer includes silicon dioxide comprising BPSG (col 2, lines 28-30).

Regarding claim 71, the reference discloses the structure of claim 66 wherein the first layer is coupled to a sidewall of the high aspect ratio contact opening (col 8, lines 14-15; col 4, lines 42-36).

Regarding claim 72, the reference discloses the structure of claim 66 wherein the second layer is coupled to an exposed semiconductor surface (col 2, lines 42-45; Fig 7).

9. Claims 73 and 75-77 are rejected under 35 U.S.C. 102(a) as being anticipated by USPN 5,644,166 to Honeycutt et al.

Regarding claim 73, the reference discloses a via comprising a first layer of electrically conductive nitride-free titanium alloy comprising titanium and germanium within a high aspect ratio contact opening in an insulating layer (col 4, lines 32-36; col 8, line 15), a second layer of titanium silicide coupled to the first layer and overlying an exposed semiconductor base layer of

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the contact hole, and a tungsten or aluminum fill coupled to the titanium alloy layer (col 8, lines 12-18, 30-34).

The reference discloses the structure of claim 73 further comprising a titanium nitride layer interposed between the titanium alloy layer and the fill (col 8, lines 16-18) as required by claim 75.

Regarding claims 76-77, the reference discloses the structure of claim 66 wherein the insulating layer includes silicon dioxide comprising BPSG (col 2, lines 28-30).

10. Claims 78-79 and 81-85 are rejected under 35 U.S.C. 102(a) as being anticipated by USPN 5,644,166 to Honeycutt et al.

11. Regarding claims 78-79, the reference discloses an electrically conductive, nitride-free titanium alloy layer comprising titanium and germanium formed overlying walls and an exposed base layer of a contact hole and a fill coupled to the titanium alloy layer wherein the fill comprises tungsten or aluminum (col 8, lines 12-16, 30-34). Further regarding claim 78, even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. Since the product in the product-by-process claim is the same as the product of the prior art, the claim is unpatentable regardless of the process used to make the prior art.

Regarding claim 81, the reference discloses the structure of claim 78 further comprising a second layer of titanium silicide coupled to the titanium alloy (col 8, lines 12-14).

Regarding claims 82 and 83, the reference discloses the structure of claims 78 and 81 respectively, further comprising a titanium nitride layer between the first or second layer and the fill (col 8, lines 15-18, 30-34).

Regarding claims 84-85, the reference discloses the structure of claim 78 wherein the first layer is coupled to a sidewall of a high aspect ratio contact opening (col 8, lines 14-15; col 4, lines 42-36).

Allowable Subject Matter

12. Claims 52, 61, 67, 74 and 80 are objected to as being dependent upon rejected base claims, but would be allowable if rewritten in independent form including all of the limitations of the base claims and any intervening claims. The references, alone or in combination, fail to teach or fairly suggest the inclusion of zinc in the titanium alloy layer.

Response to Arguments

13. Applicant's arguments with respect to claims 51-56 and 60-85 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arden B. Sperty whose telephone number is 703-305-3143. The examiner can normally be reached on M-R, 08:00-16:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on 703-308-3822. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.


abs
September 9, 2002


DEBORAH JONES
SUPERVISORY PATENT EXAMINER